6. " Researches on the Arseniates, Phosphates, and Modifications of Phosphoric Acid." By Thomas Graham, Esq., M.A, F.R.S.E., Lecturer on Chemistry in the Andersonian Institution at Glasgow. Communicated by Dr. Turner, F.R.S.

This paper, which forms the sequel to the one on the same subject which was read at the preceding meeting, continues the inquiry into the combinations of phosphoric acid with different bases, and more particularly with soda. The crystallized salt of phosphate of soda was found to contain 37·1 of the phosphate, and 62·9 of water; so that the author infers its composition to be three atoms base, namely, two of soda and one of water. The pyrophosphate of soda, on the other hand, contains only two atoms soda as base, and gives accordingly bibasic precipitates. The biphosphate of soda was found to admit of so great a number of changes in its composition and properties, as to render it an object of great interest. Of the four atoms of water which the crystals contain, they lose two atoms at the temperature of 212°, and not a particle more till the heat is raised to about 375°. There is every reason to believe that the two atoms of water retained are essential to the constitution of the biphosphate of soda; and that it contains three atoms of base, namely, one atom soda to two atoms water, united to a double atom of phosphoric acid. Other varieties of this salt are also met with; the first of which may be called a bipyrophosphate, containing only one atom of basic water; the second being anhydrous, though soluble in water, and neutral in its reaction on litmus, but of which the exact composition is not well determined; the third being an insoluble variety; and a fourth being a metaphosphate of soda,—the author designating, by the term Metaphosphoric acid, a peculiar hypothetical state of composition of the elements of phosphoric acid in conjunction with water. This new acid enters into combination with barytes and with lime, forming with these bases other metaphosphates. The author concludes by a general review of the several modifications of phosphoric acid which have resulted from these inquiries.

7. " On the Developement of the Disturbing Function upon which depend the Inequalities of the Motions of the Planets, caused by their Mutual Attraction." By James Ivory, Esq., K.H., M.A., F.R.S.

The progress of physical astronomy has been retarded by the excessive labour requisite for the arithmetical computation of the inequalities in the motions of the planets, arising from the perturbations produced by their mutual attractions. If an inequality depended solely on the quantity of the coefficient of its argument in the expanded algebraic function, the difficulty of computation would not be great, since, from the smallness of the elements on which it depends, namely, the eccentricities and the inclinations of the orbits to the ecliptic, the resulting series decreases, in every case, with great rapidity: but as its magnitude depends also upon the length of its period, the coefficient of its argument will, when this period embraces many years, acquire, in the process of integration, a high multiplier, and comes thus to have a sensible effect on the place of the planet.